

ABSTRACT

5 The present invention provides a control knob on a device that allows a user to
control functions of the device. In one embodiment, the knob is rotatable in a rotary
degree of freedom and moveable in at least one transverse direction approximately
perpendicular to the axis. An actuator is coupled to the knob to output a force in the
rotary degree of freedom about the axis, thus providing force feedback. In a different
embodiment, the knob is provided with force feedback in a rotary degree of freedom
10 about an axis and is also moveable in a linear degree of freedom approximately parallel to
the axis, allowing the knob to be pushed and/or pulled by the user. The device controlled
by the knob can be a variety of types of devices, such as an audio device, video device,
etc. The device can also include a display providing an image updated in response to
manipulation of the knob. Detent forces can be provided for the knob by overlapping and
15 adjusting ranges of closely-spaced detents in the rotary degree of freedom of the knob.